

REMARKS

In the Office Action, the Examiner rejected Claims 1-10, 12 and 14 under 35 U.S.C. §103 as being unpatentable over the prior art, principally U.S. Patents 6,211,849 (Sasaki, et al.) and 6,658,666 (Arsenault). The Examiner objected to the remaining claims, Claims 11, 13, 15 and 16, as being dependent upon rejected base claims, and indicated that these Claims 11, 13, 15 and 16 would be allowed if appropriately rewritten.

With respect to the rejections of the Claims over the prior art, Claims 1, 4, 6 and 7 were rejected over Sasaki, et al. in view of Arsenault; Claims 2 was rejected over Sasaki, et al. in view of Arsenault and further in view of U.S. Patent 5,751,261 (Zavracky, et al.); and Claim 3 was rejected as being unpatentable over Sasaki, et al. in view of Arsenault, and further in view of U.S. Patent 5,623,519 (Babcock, et al.). Claim 5 was rejected as being upatentable over Sasaki, et al. and Arsenault and further in view of U.S. Patent 5,801,674 (Shimizu); Claim 8 was rejected over Sasaki, et al. and Arsenault, and further in view of U.S. Patent 5,974,464 (Shin, et al.); and Claim 9 was rejected over Sasaki, et al. and Arsenault and further in view of U.S. Patent 5,825,777 (Komarek, et al.). Claim 10 was rejected over Arsenault in view of Sasaki, et al; Claim 12 as rejected over Sasaki, et al. in view of Arsenault and U.S. Patent 6,335,778 (Kubota, et al.); and Claim 14 was rejected over Sasaki, et al. in view of Arsenault and U.S. Patent 6,204,864 (Jayavant).

Claims 11, 13 and 15 are being rewritten in independent form, including the limitations of the respective base claims. Specifically, these Claims 11, 13 and 15 are being amended to include the limitations of Claims 10, 12, and 14 respectively. It is believed that this places Claims 11, 13, and 15 in condition for allowance without further argument. The Examiner is,

accordingly, respectfully asked to reconsider and to withdraw the objections to Claims 11, 13 and 15, and to allow these claims.

Also, Claims 1, 6, 10, 12 and 14 are being amended to better define the subject matters of these claims. Claims 2 and 8 are being cancelled to reduce the number of issues in this application. Independent Claim 4, it may be noted, is not being amended, and the rejections of Claim 4 and Claim 5, which is dependent from Claim 4, are respectfully traversed.

As discussed in detail in the present application, this invention relates to a liquid crystal display device. In this device, a driver interface and the individual driver ICs are connected together in series, either be a video signal line or a transmission line, and in use, video signal data are transmitted to the driver ICs over those lines.

Sasaki, et al and Shimizu disclose liquid crystal display devices. As discussed below, though, there are a number of important differences between the present invention and the devices shown in these patents.

Arsenault, et al. does not relate to liquid crystal display devices, and this reference was cited by the Examiner for its disclosure of the use of a digital packet information including an input video signal.

With respect to Claim 1 and Claim 3, which is dependent from Claim 1, the cited references do not disclose the feature, described in Claim 1, that the driver ICs are cascade-connected – connected in series – to a power feed line via a metal layer inside of each of the driver ICs.

This feature of the invention enables the minimization of the number of signal propagations on high-resistivity wiring. Sasaki teaches a ICs cascade connection method, however this reference does not suggest that a plurality of signals (video, clock, power source)

are passed through metals of the driver ICs. As the Examiner pointed out in the Office Action, Zavracky shows that an aluminum interconnect (metal layer) could be used for a power feed line, however this metal is used for LCDs pixel driving and is placed outside of the ICs, and thus does not suggest placing the power feed line inside the driver ICs.

Because of the above-discussed differences between Claim 1 and the prior art, and because of the advantages associated with those differences, Claims 1 and 3 patentably distinguish over the prior art and are allowable. The Examiner is, thus, asked to reconsider and to withdraw the rejections of Claims 1 and 3 and to allow these claims.

With regard to Claim 4 and Claim 5, which is dependent from Claim 4, the prior art does not disclose or teach the feature, described in Claim 4, of providing a masking signal from an upstream driver IC to a down stream driver IC. Arsenault, et al, for example, was cited for its disclosure of a bit mask; however, this reference does not teach masking signals from an upstream IC driver to a downstream IC driver, as described in Claim 4.

The other references of record have been reviewed, and they too, whether considered individually or in combination, do not suggest this feature of the invention.

In light of the above-discussed differences between Claim 4 and the prior art, and in view of the advantages associated with those differences, it cannot be said that Claim 4 is obvious over that prior art. Hence, this Claim and Claim 5 patentably distinguish over the prior art and are allowable, and the Examiner is requested to reconsider and to withdraw the rejections of Claims 4 and 5 and to allow these claims.

Claim 6, similar to Claim 1, describes the feature that the driver comprises a clock line and a power line which make a cascade connection to the plurality of driver ICs of a metal layer inside of each of the driver ICs. For reasons analogous to those advanced above in connection

with Claim 1, the prior art of record does not disclose or suggest connecting the driver ICs in series by a metal layer inside of each of the driver ICs, as described in Claim 6. Claim 6, and Claims 7 and 9, which are dependent from Claim 6, thus patentably distinguish over the prior art and are allowable. The Examiner is, accordingly, requested to reconsider and to withdraw the rejections of Claims 6, 7 and 9, and to allow these claims.

With respect to Claim 10, another important feature of the present invention is the use of a table to generate the header information for the packet data that are output to the LCD driver. This feature is now described in Claim 10. Claim 10 also describes the feature that the driver ICs are cascade connected in series via a metal layer inside of each of said driver ICs.

As the Examiner noted in the Office Action, Arsenault, et al, does not teach an LCD driver comprising a plurality of driver ICs. While Sasaki, et al. shows a plurality of signal lines in an LCD device, this reference does not teach the use of a table in the manner described in Claim 10, nor does Sasaki, et al. suggest the use of a metal layer inside of each of the driver ICs to connect those drivers in series. The other references of record also fail to disclose or suggest these aspects of the invention. Thus, Claim 10 also patentably distinguishes over the prior art and is allowable, and the Examiner is asked to reconsider and to withdraw the rejection of, and to allow, Claim 10.

Claims 12 and 14, like Claim 1, describe the feature that the driver ICs are cascade connected in series via a metal layer inside of each of said driver ICs. Claims 12 and 14, additionally, describe a digital packet signal including the video signal.

The combination of the cascade-connected driver ICs and packet communication, as described in Claims 12 and 14, is not obvious because the invented configuration enables

minimization of the number of interface signals by employing high speed serial interface for video data and control signal with packet communication.

Accordingly, Claims 12 and 14, and Claim 16, which is dependent from Claim 14, patentably distinguish over the prior art and are allowable. The Examiner is thus requested to reconsider and to withdraw the rejections of Claims 12, 14 and 16, and to allow these claims.

For the reasons discussed above, the Examiner is asked to reconsider and to withdraw the rejections of Claims 1, 3-7, 9, 10, 12 and 14, and the objections to Claims 11, 13, 15 and 16, and to allow Claims 1, 3-7 and 9-16. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is asked to telephone the undersigned.

Respectfully Submitted,

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